UNIVERSITI TEKNOLOGI MARA

ARTIFICIAL INTELLIGENCE BASED TECHNIQUE FOR CLASSIFICATION OF INCIPIENT FAULTS IN POWER TRANSFORMER BASED ON DISSOLVED GAS ANALYSIS (DGA) METHOD

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Thesis submitted in fulfilment
of the requirements for the degree of
Master of Science

Faculty of Electrical Engineering

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Power transformer has been identified as crucial and vital equipment in power system. Any disturbance such as faults will result in immense impact to the whole power system. This thesis presents the development of an Evolutionary Programming (EP) – Taguchi Method (TM) – Artificial Neural Network (ANN) based technique for the classification of incipient faults in power transformer using Dissolved Gas Analysis (DGA) method based on historical industrial data. It involved with the development of ANN model and embedding TM and EP as the optimization technique in order to enhance the system accuracy and efficiency. ANN is a powerful computational technique that mimics how human brain process information. It has great ability to learn from experiences and examples, hence greatly suitable for classification, pattern recognition and forecasting purposes. In designing the ANN model, there are parameters which need to be chosen wisely. However, there is no systematic ways and guidelines to select the optimal ANN parameters. It is greatly dependent on the design knowledge and experiences of the experts. The process of finding suitable parameters is become difficult, tedious and time consuming, thus optimization technique is needed to overcome the shortcoming. In this study, TM and EP are employed as the optimization techniques to improve the ANN-based model. The findings obtained from the proposed technique have proven that the effectiveness of both TM and EP in optimizing the ANN model. As a result, a reliable EP-TM-ANN based system has been successfully developed that can classify incipient faults in power transformer.

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